

Quantum Algorithms for Open Quantum Systems

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Contemporary quantum technologies typically utilize unitary quantum mechanics to transform and store information. Unitary evolution is consistent with closed quantum systems, that is, systems which are not interacting with an environment. Open quantum systems interact with an environment, are described by non-unitary dynamics, and require a mapping to unitary-gate-based quantum architectures. Here I discuss several such mappings and algorithms for transforming non-unitary open quantum system dynamics into unitary frameworks. We discuss algorithms and applications that are suitable to both the current near intermediate-scale quantum (NISQ) era, and those more suited to fault-tolerant quantum computing.